Claims

1. An actinic radiation curable composition comprising:

(A) at least one actinic radiation curable, cationically polymerisable compound;

(B) at least one cationic photoinitiator for component (A); and

(C) at least one stabiliser which is a complex of a Lewis acid and a Lewis base, provided that the Lewis acid is not a fluorine-containing boron compound; component (C) being present in the composition in an amount of from 0.001 to 0.3 wt% and the relative amounts of Component (B) and Component (C) being such that the composition is stabilised relative to the corresponding composition in which Component (C) is not present.

2. A composition as claimed in claim 1, in which the Lewis acid of component (C) is selected from BX_3, AlX_3, FeX_3, FeX_2, ZnX_2, TiX_3 or TiX_4 where each X independently represents a C(1-6)alkyl or C(1-6)alkoxy group or a hydrogen, chlorine, bromine, iodine or fluorine atom, provided that if the Lewis acid is BX_3, no X is a fluorine atom.

3. A composition as claimed in claim 2, in which the Lewis acid of component (C) is BH_3 or BCl_3.

4. A composition as claimed in any one of claims 1 to 3, in which the Lewis base of component (C) is ammonia, phosphine, an amine or a phosphine.

5. A composition as claimed in claim 4, in which the Lewis base of component (C) is ammonia, phosphine or an amine or a phosphine of the general formula

$$Z(R_8)_3 \qquad (IV)$$

in which Z is nitrogen or phosphorus, and each R_8 independently represents a hydrogen atom (provided that not more than two R_8 groups represent hydrogen); an alkyl group having from 1 to 20, preferably from 1 to 8 carbon atoms, optionally substituted by one or more phenyl groups (in which the phenyl group may be optionally substituted by one or more C(1-12)alkyl groups and/or halogen atoms) or C(5-7)cycloalkyl groups; a phenyl group optionally substituted by one or more C(1-12)alkyl groups and/or halogen atoms; or a C(5-7)cycloalkyl group; or two R_8's together represent an alkylene group having from 4 to 6 carbon atoms one or more of which may be replaced by an oxygen or a sulphur atom; and in which each alkyl, cycloalkyl or phenyl group present in the compound of the formula IV may be optionally substituted by one or more, preferably one or two, groups $-Z(R_8)_2$.

6. A composition as claimed in claim 5, in which each R_8 independently represents a C(1-12)alkyl group or a phenyl group.

7. A composition as claimed in claim 1, in which component (C) is selected from the group consisting of borane ammoniac complex; borane triethylamine complex; borane tributylphosphine complex; borane trimethylamine complex; borane triphenylphosphine complex; borane tributylamine complex; borane N,N-diethylamine complex;

borane N,N-diisopropyl ethylamine complex; borane dimethylamine complex; borane N-ethyl-N-isopropyl aniline complex; borane 4-methyl-morpholine complex; borane 4-ethylmorpholine complex; bis-(triethylborane) 1,6-diaminohexane complex; trichloroborane N,N-dimethyloctylamine complex; trichloroborane N,N-dimethyloctylamine complex; trichloroborane triethylamine complex; trichloroborane pyridine complex; trichloroborane benzylamine complex; irontrichloride triethylamine complex; irontrichloride pyridine complex; and irontrichloride N,N-dimethyloctylamine.

8. A composition as claimed in claim 7, in which component (C) is boron trimethylamine complex; boron tributylphosphine complex; boron ammoniac complex; bis-(triethylborane) 1,6-diaminohexane complex; trichloroborane triethylamine complex; trichloroborane pyridine complex; trichloroborane benzylamine complex; irontrichloride triethylamine complex; irontrichloride pyridine complex; or irontrichloride N,N-dimethyloctylamine.

9. A composition as claimed in any one of claims 1 to 8, in which component (A) includes an epoxy compound.

10. A composition as claimed in claim 9, in which component (A) includes a cycloaliphatic diepoxide.

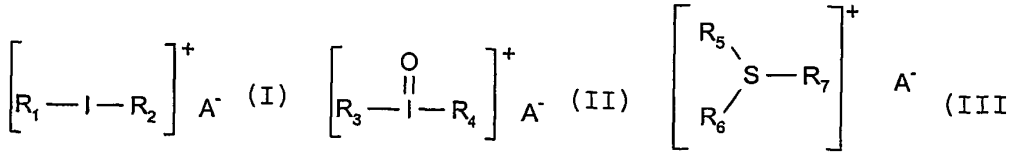
11. A composition as claimed in claim 10, in which the monomer purity of the cycloaliphatic diepoxide is 90% or higher.

12. A composition as claimed in either claim 10 or claim 11, in which component (A) includes one or more

cycloaliphatic diepoxides selected from bis(4-hydroxycyclohexyl)methane diglycidyl ether, 2,2-bis(4-hydroxycyclohexyl)propane diglycidyl ether, 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexanecarboxylate, 3,4-epoxy-6-methyl-cyclohexylmethyl-3,4-epoxy-6-methylcyclohexanecarboxylate, di-(3,4-epoxycyclohexylmethyl)hexanedioate, di-(3,4-epoxy-6-methyl-cyclohexylmethyl)hexanedioate, ethylenebis(3,4-epoxycyclohexanecarboxylate), ethanediol di-(3,4-epoxycyclohexylmethyl) ether and 2-(3,4-epoxycyclohexyl-5,5,3-dioxane.

13. A composition as claimed in any one of claims 1 to 12, in which component (B) is an onium salt with an anion of weak nucleophilicity.

14. A composition as claimed in claim 13, in which component (B) comprises an onium salt of general formula (I), (II) or (III):



in which each of R_1, R_2, R_3, R_4, R_5, R_6, and R_7 independently of one another are C_6-C_{18}aryl which is unsubstituted or substituted by appropriate radicals, and A^- is $CF_3SO_3^-$ or an anion of the formula $[LQ_m]^-$, where

L is boron, phosphorus, arsenic or antimony,

Q is a halogen atom, or some of the radicals Q in an anion LQ_m^- may also be hydroxyl groups, and

m is an integer corresponding to the valency of L enlarged by 1.

15. A composition as claimed in claim 14, in which component (B) is a compound of the formula (III) in which R5, R6 and R7 are phenyl and/or biphenyl.

16. A composition as claimed in any one of claims 1 to 15, which comprises a mixture of one or more cationically polymerisable compounds as component (A).

17. A composition as claimed in any one of claims 1 to 16, which also comprises one or more free radically curable substances together with a free radical initiator.

18. A composition as claimed in claim 17, which comprises at least one monomeric or oligomeric acrylate or methacrylate.

19. A composition as claimed in any one of claims 1 to 18, which also contains a polytetrahydrofuran diol or polyol having a molecular weight of about 250 to about 4000, or a siloxane/polyethylene oxide copolymer.

20. A composition as claimed in claim 1, which comprises:

a) from 40 to 80% by weight of at least one liquid epoxy resin having an epoxy functionality of equal to or greater than 2,

b) from 0.1 to 10% by weight of at least one cationic photoinitiator for component a),

c) from 5 to 40% by weight of at least one liquid diacrylate,

d) from 0 to 15% by weight of at least one liquid poly(meth-)acrylate having a (meth-)acrylate functionality of greater than 2,

e) from 0.1 to 10% by weight of at least one radical photoinitiator for component c) and, where appropriate, d),

f) from 5 to 40% by weight of at least one OH-terminated polyether, polyester or polyurethane, and

g) at least one stabiliser which is a complex of a Lewis acid and a Lewis base, the Lewis acid being other than a fluorine-containing boron compound; component (g) being present in the composition in an amount of from 0.001 to 0.3wt%, and the relative amounts of Component (b) and Component (g) being such that the composition is stabilised relative to the corresponding composition in which Component (g) is not present.

21. A process for producing a cured product, which comprises treating a composition according to any one of claims 1 to 20 with actinic radiation.

22. The use of a complex of a Lewis acid and a Lewis base other than one in which the Lewis acid is a fluorine-containing boron compound, as a stabiliser for a composition containing at least one radiation curable, cationically polymerisable compound and at least one cationic photoinitiator for said compound.

23. The use of a complex of a compound of the general formula BX_3 in which each X independently represents a C(1-6)alkyl group or a hydrogen, chlorine, bromine or iodine atom with ammonia, phosphine, an amine or a phosphine, as a stabiliser for a composition containing at least one radiation curable, cationically polymerisable compound and at least one cationic photoinitiator for said compound.

24. A process for the stabilization of a composition containing

(A) at least one actinic radiation curable, cationically polymerisable compound; and

(B) at least one cationic photoinitiator for component (A);

which comprises admixing with said components (A) and (B), a complex of a Lewis acid other than a fluorine-containing boron compound and a Lewis base in an amount such that the composition is stabilised in relation to the corresponding composition not containing said complex.